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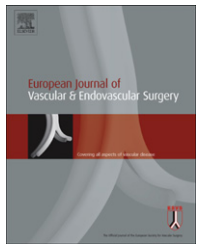

SHORT REPORT

Mycotic Carotid Pseudoaneurysm: Staged Endovascular and Surgical Repair

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Abstract Mycotic carotid pseudoaneurysms are rare and challenging to manage. Traditional surgical approaches are technically demanding and can be associated with a high morbidity and mortality. The use of endovascular stents in infected fields remains controversial, and long-term efficacy has not been fully clarified. We describe a case where a combined staged endovascular and open surgical approach was used to successfully manage a mycotic carotid pseudoaneurysm that developed following dental extraction. A covered endovascular stent was used to temporarily exclude the infected pseudoaneurysm, before proceeding to early definitive surgical management.

We suggest that staged endovascular therapy followed by early surgical repair should be considered for this difficult surgical problem.

Introduction

Extracranial mycotic carotid pseudoaneurysms are rare, and are associated with a high morbidity and mortality.[1] Traditional open surgical approaches include arterial ligation, debridement of infected tissue, with in-situ or extra-anatomical revascularisation. The use of endovascular stents in infected fields remains controversial, and long-term efficacy has not been fully elucidated.[2] Although effective in controlling acute bleeding complications, concerns have been raised regarding the high incidence of delayed stent-related complications.[3,4] We report the successful staged management of a mycotic carotid pseudoaneurysm, where initial control of bleeding was achieved by an endovascular stent, followed by early definitive surgery.

Case Report

A 79 year-old diabetic male presented with a six-week history of a rapidly expanding right-sided neck mass,

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associated with progressive dysphagia and dysphonia. Initial onset of symptoms occurred following a right-sided dental extraction, performed two months previously.

Examination revealed a large 10×8 cm, pulsatile swelling, based in the right anterior triangle of the neck. The patient was afebrile, with an elevated white cell count of 13.2×10^9/L.

CT angiogram and diagnositic arteriography confirmed a large pseudoaneurysm at the bifurcation of the right common carotid artery, with no flow evident in the external carotid artery (Figs. 1A and B). Carotid artery stenting was subsequently performed, using an Amplatz extra-stiff 0.035-in wire (Boston Scientific, Natick, MA, USA) to cannulate the right internal carotid artery, followed by a 10F guiding sheath. A 6 mm $\times$ 40 mm Fluency PTFE-covered nitinol self-expanding stent (Bard Peripheral Vascular, Tempe, AZ. USA.) was deployed across the pseudoaneurysm neck, followed by an 8 mm $\times$ 40 mm stent (Fluency, Bard) to fully exclude proximal in-flow (Fig. 1C).

After 48 hours of broad spectrum intravenous antibiotics, surgical exploration was performed. A 2.0 cm defect was present in the carotid artery at the level of the bifurcation, with significant exposure of the covered stent, surrounded by extensive infected haematoma (Fig. 2A). The carotid bifurcation was resected (Fig. 2 B), followed by insertion of a Javid shunt and debridement of surrounding tissues. The right internal carotid artery was reconstructed using reversed long saphenous vein, tunnelled extra-anatomically through sternocleidomastoid to obtain adequate coverage. The operative wound was partially closed, with a vacuum dressing applied at 48 hours. Operative specimens grew mixed organisms, including *Staphylococcus epidermidis*, *Staphylococcus capitis* and *Proprionibacterium*.

A right-sided Horner's syndrome was evident in the recovery period, with a meiosis and mild ptosis. The patient had tongue deviation, consistent with a hypoglossal nerve palsy. A CT angiogram obtained postoperatively confirmed normal flow in the reconstructed right internal carotid artery, with no evidence of cerebral infarction (Fig. 3). Antibiotics were continued for six weeks post-operatively.

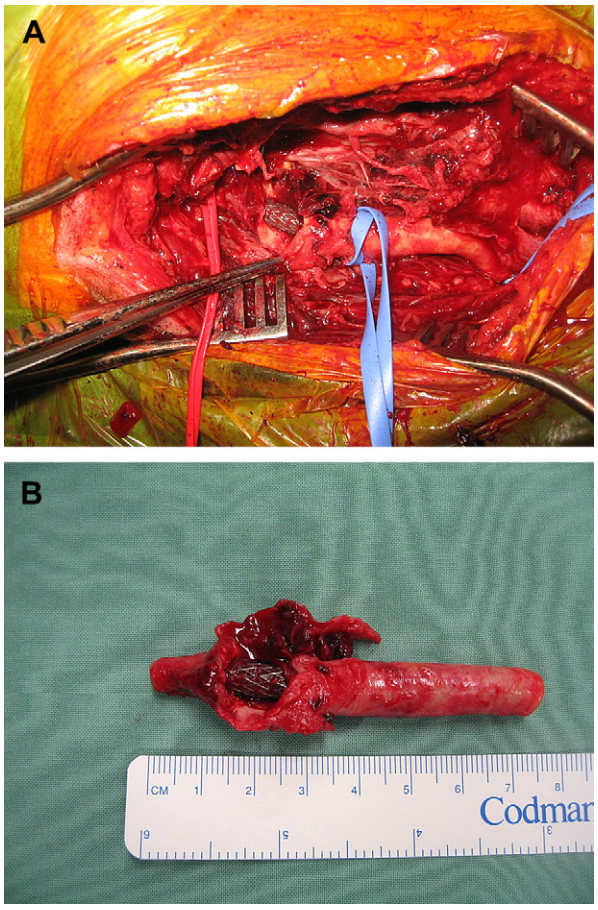

Figure 2 (A) Exposed stent evident at carotid bifurcation during operative neck exploration. (B) Excised specimen of the carotid bifurcation, including the covered endoluminal stent.

Discussion

Mycotic extracranial carotid pseudoaneurysms are rare, but can occur due to local or systemic infective processes, including dental suppuration, bacterial sinusitis, bacterial endocarditis and bacteraemias.[2] Proposed pathogenic mechanisms include bacterial destruction of the arterial

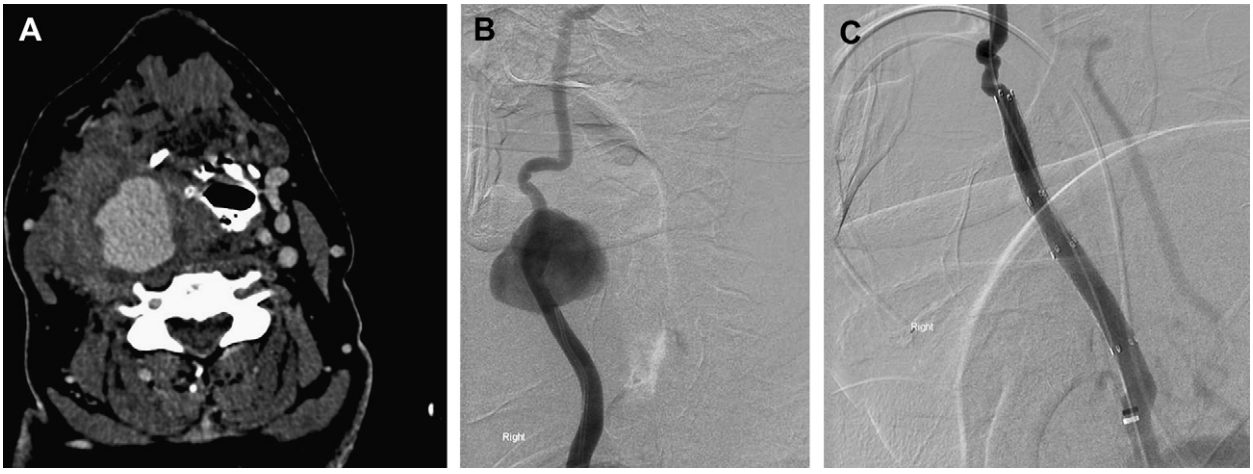

Figure 1 (A) CT angiogram showing the pseudoaneurysm at the carotid bifurcation. (B)Diagnostic carotid angiogram confirming pseudoaneurysm. (C) Angiogram showing successful endovascular exclusion of the right carotid pseudoaneurysm.

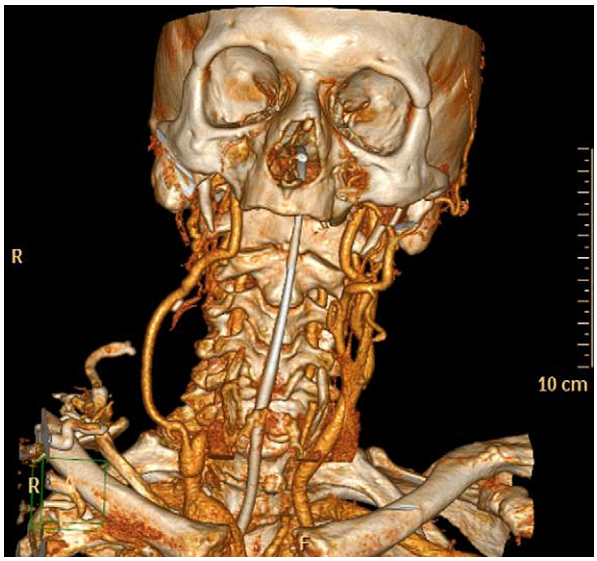

Figure 3 Post-operative CT angiogram confirming graft patency.

wall by septic emboli or direct vessel encroachment, leading to potentially fatal bleeding or thromboembolic complications. Although mycotic carotid pseudoaneurysms following dental extractions are more commonly described in children, other recognised risk factors include diabetes, immunosuppression, HIV, trauma and malignancy.[5]

Traditional open surgical approaches include aneurysmectomy and debridement with carotid artery ligation, autogenous graft replacement, or extra-anatomic bypass. Open surgery in the acute setting is generally associated with poor outcomes, including stroke and mortality of up to 50% of patients if the carotid artery is ligated.[1] Endovascular carotid stenting has recently been advocated as an alternative approach to definitive management.[2,5]

Although peri-procedural risks of thromboembolism may be justified when using endoluminal approaches for the control of acute carotid haemorrhage, concerns have recently been raised regarding longer-term safety and efficacy of stenting in this context. In the few case series reported, there appears to be a high incidence of complications in patients receiving endoluminal carotid stents for carotid pseudoaneurysm or blow-out due to malignancy and infection. Complications include stent erosion, exposure, extrusion and thrombosis, persistent infection and late rebleeding, which perhaps should be expected in patients with significant vessel wall defects in the presence of infection.[3,4,6]

Whilst acute mycotic carotid pseudoaneurysms can be initially successfully managed with endovascular covered stents, the high risk of delayed complications could make this a temporising rather than permanent solution, in patients deemed fit for definitive surgery. In the case reported, preliminary placement of a covered stent provided initial control of the carotid blow out, allowing safe exploration of the neck for definitive surgical management. We suggest that a staged procedure, using an endovascular approach for initial control, followed by definitive surgery, should be considered for this difficult surgical problem.

Conflict of Interest/Funding

None.

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References

1 Bagia J, Hall R. Extracranial mycotic carotid pseudoaneurysm. *ANZ J Surg* 2002;**72**:970—1.
2 Riga C, Bicknell C, Jindal R, Cheshire N, Hamady M. Endovascular stenting of peripheral infected aneurysms: a temporary measure or definitive solution in high-risk patients. *Cardiovasc Intervent Radiol* 2008;**31**:1228—35.
3 McCready RA, Divelbiss JL, Bryant MA, Denardo AJ, Scott JA. Endoluminal repair of carotid artery pseudoaneurysms: a word of caution. *J Vasc Surg* 2008;**40**(5):1020—3.
4 Simmental A, Johnson JT, Horowitz M. Delayed complications of endovascular stenting for carotid blowout. *Am J Otol* 2003;**24**(6):417—9.
5 Ferguson DJ, Boyle JR, Millar J, Phillips MJ. Retrograde endovascular management of a mycotic internal carotid artery false aneurysm. *Eur J Vasc Endovasc Surg* 2002;**24**:88—90.
6 Warren FM, Cohen JI, Nesbit GM, Barnwell SL, Wax MK, Anderson PE. Management of carotid blowout with endovascular stent grafts. *Laryngoscope* 2002;**112**(3):428—33.